METHOD AND APPARATUS FOR SHARING USER INFORMATION IN A GROUP COMMUNICATION NETWORK

FIELD

[0001] The present invention relates to point-to-point or point-to-multipoint communications systems. More specifically, the present invention relates to methods and apparatus for detecting, sharing, and/or announcing user presence and/or location information in a group wireless communication network.

BACKGROUND

[0002] A class of wireless services intended for quick, efficient, one-to-one or one-to-many (group) communication has existed in various forms for many years. In general, these services have been half-duplex, where a user presses a "push-to-talk" (PTT) button on a phone/radio to initiate a group communication. If granted the floor, the talker then generally speaks for a few seconds. After the talker releases the PTT button, other users who are available may request the floor. These services have traditionally been used in applications where one person needs to communicate with a group of people, such as field service personnel or taxi drivers, generally known as group communication services.

[0003] There is a need, therefore, for mechanisms that allow a user or a group of users to efficiently detect or announce information, such as user presence and/or location information, to other user or group of users.

SUMMARY

[0004] The disclosed embodiments provide novel and improved methods and apparatus for detecting and/or announcing user presence and/or location information in a wireless communication network. In one aspect, the method for sharing user information in a wireless communication network includes sending an alert from an originator to a target, the alert including information about the originator and requesting information about the target, receiving information by the originator from the target in response to the alert, and updating information in the originator about the target, based on the received information.

[0005] In another aspect, the method includes sending at least one alert from an originator requesting information about at least one target user, receiving information by

the originator in response to the alert, and updating information by the originator about the target user, based on information received.

[0006] In one aspect, an apparatus for sharing user information in a wireless communication network includes a memory unit, a receiver, a transmitter, and a processor communicatively coupled with the memory unit, the receiver, and the transmitter. The processor is capable of carrying out the above-mentioned methods.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The features and advantages of the present invention will become more apparent from the detailed description of the embodiments set forth below:

[0008] FIG. 1 illustrates a group communications system;

[0009] FIG. 2 illustrates how several communication devices interact with a group communication server;

[0010] FIG. 3 illustrates one embodiment for an infrastructure for implementing various disclosed embodiments;

[0011] FIGS. 4(A) and 4(B) illustrate flow diagrams for detecting and/or announcing presence and/or location information; and

[0012] FIG. 5 illustrates a flow diagram for determining status information about a group of users.

DETAILED DESCRIPTION

[0013] Before several embodiments are explained in detail, it is to be understood that the scope of the invention should not be limited to the details of the construction and the arrangement of the components set forth in the following description or illustrated in the drawings. Also, it is to be understood that the phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting.

[0014] FIG. 1 illustrates a functional block diagram of a group communication system **100**, for implementing one embodiment. Group communication system **100** is also known as a push-to-talk (PTT) system, a net broadcast service (NBS), a dispatch system, or a point-to-multi-point communication system. In one embodiment, group communication system **100** includes a group communication server (GCS) **102**, which may be deployed in either a centralized deployment or a regionalized deployment. Group communication server **102** may be implemented as known in the art, including

one or more processor, one or more memory units, and input/out hardware and software modules for various media communications, e.g., IP media communication.

[0015] Group communication devices (CDs) **104** and **106**, which may be deployed such as CDMA (e.g., cdma2000) handsets, for example, may request packet data sessions using a data service option. Each CD may use the session to register its Internet protocol (IP) address with the group communication server to perform group communication initiations. In one embodiment, group communication server **102** is connected to the service provider's packet data service nodes (PDSNs) through service provider's network **116**. CDs **104** and **106**, upon requesting packet data sessions from the wireless infrastructure, may have IP connectivity to group communication server **102** through the PDSNs **114**. Each PDSN may interface to a base station controller (BSC) through a packet control function (PCF) **108** and a network **112**. The PCF may be co-located with the BSC within a base station (BS) **110**.

[0016] A packet data service node may fall in one of several states, e.g., active or connected state, dormant state, and null or inactive state. In the active or connected state, a active traffic channel exists between the participating CD and the BS or BSC, and either side may send data. In the dormant state, no active traffic channel exists between the participating CD and the BSC, but a point-to-point protocol (PPP) link is maintained between the participating CD and the PDSN. In the null or inactive state, there is no active traffic channel between the participating CD and the BSC, and no PPP link is maintained between the participating CD and the PDSN.

[0017] Each one of CDs **104** and **106** may request packet data sessions. As part of establishing a packet data session, each CD may be assigned an IP address. Each CD may perform a registration process to notify group communication server **102** of the CD's IP address. Registration may be performed using an IP protocol, such as session initiation protocol (SIP) over user datagram protocol (UDP). The IP address of a CD may be used to contact the CD when the corresponding user is invited into or informed of a group communication.

[0018] Once a group communication is established, CDs **104** and **106** and group communication server **102** may exchange media and signaling messages. In one embodiment, media may be exchanged between the participating CDs and the group communication server by using real-time protocol (RTP) over UDP. The signaling messages may also be exchanged by using a signaling protocol over UDP.

[0019] Group communication system **100** performs several different functions in order to operate group communication services. The functions that relate to the user side include user registration, group communication initiation, group communication termination, sending messages to group participants, late join to a group communication, talker arbitration, adding members to a group, removing members from a group, un-registering a member, and user authentication. The functions that relate to system preparation and operation include administration and provisioning, scalability, and reliability.

[0020] FIG. 2 illustrates a group communication arrangement **200** for showing how CDs **202**, **204**, and **206** interact with a group communication server **208**. Multiple group communication servers may be deployed as desired for large-scale groups. A user may input her desire to a CD **202**, **204**, **206** to initiate a communication session for exchanging communication media, e.g., data, voice, image, and/or video, with one or more CDs. In one embodiment, the user may first invite the target users(s) before starting to communicate media, by pushing an "invite" or a PTT button on a CD.

[0021] In FIG. 2, when CD **202** has permission to transmit media to other members of the group, CD **202** is known as the originator and may transmit media over an established channel. When CD **202** is designated as the originator, the remaining participants, CD **204** and CD **206**, may not be permitted to transmit media to the group. Accordingly, CD **204** and CD **206** are designated as targets. As described above, CDs **202**, **204**, and **206** are connected to group communication server **208**, using at least one channel. In one embodiment, channels **210**, **212**, and **214** may include a session initiation protocol (SIP) channel, a media-signaling channel, and a media traffic channel.

[0022] FIG. 3 is a simplified block diagram of one embodiment of an infrastructure including a base station/base station controller (BS/BSC) **304** and a communication device **306**, which are capable of implementing various disclosed embodiments. For a particular media communication, voice, data, packet data, and/or alert messages may be exchanged between BS/BSC **304** and communication device **306**, via an air interface **308**. Various types of messages may be transmitted, such as messages used to establish a communication session between the base station and the communication device, registration and paging messages, and messages used to control a data transmission (e.g., power control, data rate information, acknowledgment, and so on). Some of these message types are described in further detail below.

[0023] For the reverse link, at communication device **306**, voice and/or packet data (e.g., from a data source **310**) and messages (e.g., from a controller **330**) are provided to a transmit (TX) data processor **312**, which formats and encodes the data and messages with one or more coding schemes to generate coded data. Each coding scheme may include any combination of cyclic redundancy check (CRC), convolutional, turbo, block, and other coding, or no coding at all. The voice, packet data, and messages may be coded using different schemes, and different types of messages may be coded differently.

[0024] The coded data is then provided to a modulator (MOD) **314** and further processed (e.g., covered, spread with short PN sequences, and scrambled with a long PN sequence assigned to the communication device). The modulated data is then provided to a transmitter unit (TMTR) **316** and conditioned (e.g., converted to one or more analog signals, amplified, filtered, and quadrature modulated) to generate a reverse link signal. The reverse link signal is routed through a duplexer (D) **318** and transmitted via an antenna **320** to BS/BSC **304**.

[0025] At BS/BSC **304**, the reverse link signal is received by an antenna **350**, routed through a duplexer **352**, and provided to a receiver unit (RCVR) **354**. Alternatively, the antenna may be part of the wireless operator network, and the connection between the antenna and the BS/BSC may be routed through the Internet. BS/BSC **304** may receive media information and alert messages from communication device **306**. Receiver unit **354** conditions (e.g., filters, amplifies, down converts, and digitizes) the received signal and provides samples. A demodulator (DEMOD) **356** receives and processes (e.g., despreads, decovers, and pilot demodulates) the samples to provide recovered symbols. Demodulator **356** may implement a rake receiver that processes multiple instances of the received signal and generates combined symbols. A receive (RX) data processor **358** then decodes the symbols to recover the data and messages transmitted on the reverse link. The recovered voice/packet data is provided to a data sink **360** and the recovered messages may be provided to a controller **370**. Controller **370** may include instructions for receiving and sending alerts, and receiving and sending responses to alerts. The processing by demodulator **356** and RX data processor **358** are complementary to that performed at remote access device **306**. Demodulator **356** and RX data processor **358** may further be operated to process multiple transmissions received via multiple channels, e.g., a reverse fundamental channel (R-FCH) and a reverse supplemental channel (R-SCH). Also, transmissions may be simultaneously

from multiple communication devices, each of which may be transmitting on a reverse fundamental channel, a reverse supplemental channel, or both.

[0026] On the forward link, at BS/BSC **304**, voice and/or packet data (e.g., from a data source **362**) and messages (e.g., from controller **370**) are processed (e.g., formatted and encoded) by a transmit (TX) data processor **364**, further processed (e.g., covered and spread) by a modulator (MOD) **366**, and conditioned (e.g., converted to analog signals, amplified, filtered, and quadrature modulated) by a transmitter unit (TMTR) **368** to generate a forward link signal. The forward link signal is routed through duplexer **352** and transmitted via antenna **350** to remote access device **306**. Forward link signals include paging signals.

[0027] At communication device **306**, the forward link signal is received by antenna **320**, routed through duplexer **318**, and provided to a receiver unit **322**. Receiver unit **322** conditions (e.g., down converts, filters, amplifies, quadrature modulates, and digitizes) the received signal and provides samples. The samples are processed (e.g., despreaded, decovered, and pilot demodulated) by a demodulator **324** to provide symbols, and the symbols are further processed (e.g., decoded and checked) by a receive data processor **326** to recover the data and messages transmitted on the forward link. The recovered data is provided to a data sink **328**, and the recovered messages may be provided to controller **330**. Controller **330** may include instructions for receiving and sending alerts, receiving and sending responses to alerts, keeping status information about other users in a designated group of users, and updating status information.

[0028] A user or a group of users may detect or announce user information, such as user-presence, user availability, and/or user-location information, to other user or group of users, without placing a call, establishing a communication session, or burdening the server. In one embodiment, each user may alert members of a designated group when the user becomes available, e.g., the user goes online. This would eliminate the configuration problems associated with server-based solutions. Users may configure their group lists, as users may belong to multiple groups, and switch between groups, without requiring configuration changes at the server, according to one embodiment.

[0029] In one embodiment, user presence and/or location detection is announced through point-to-point alerts or group alerts (point-to-multipoint) on power up (Hello) and shutdown (Bye). Additional alerts may be sent periodically to detect if a user has has become unavailable without sending a "Bye" (e.g., to detect power or coverage loss).

[0030] For example, using user-initiated point-to-point alerts, user A sends a "Hello" alert, on power up, to the rest of members in a designated group (e.g., A, B, and C). If a point-to-point guaranteed delivery alert is used, user A receives an "Ack" alert if the alert is successfully delivered, or a "Nak" alert if it isn't. If an Ack alert is received from user B and a Nak alert is received from user C, user A figures out that user B is already online and user C is not. When user B, who is already online, receives a Hello alert from user A, user B determines that user A has come online. Later, when user A goes offline, user A sends a "Bye" message to users B and C. When user B receives the "Bye" message from user A, user B determines that user A is no longer online.

[0031] FIGS. 4(A) and 4(B) illustrate flow diagrams for announcing and/or sharing presence and/or location information, according to one embodiment. User A may select a member list from a directory of stored individual and/or group member lists, and presses a button (e.g., the PTT button) on his or her CD, to announce his or her presence and/or location information to the selected group. User A may also create an ad-hoc group list, or designate a default group list for this purpose. For example, the designated group may include users B, C, and D, as shown by user A's "buddy list."

[0032] Upon activation by user A, user A's CD sends group alerts to target users B, C, and D, e.g., through the group communication server, as shown in step **402**. The group message may include information such as user A's presence (e.g., "on," "off," "away," etc.), user A's location (e.g., "at work," "in meeting," "at lunch," etc.), and/or user A's availability (e.g., "busy," "on phone," etc.). In one embodiment, the group communication server sends an alert to each target user in the designated group (e.g., B, C, and D), as shown in step **404**.

[0033] Each target user in the designated group that receives an alert may respond with a message, e.g., an alert, indicating the target user's status, as shown in step **406**. For example, target user B may respond with an "ACK" response, indicating that user B is ON or available, user C may respond with a "NAK" response, indicating that user C is OFF or unavailable, user D may respond with a "in meeting" or "at airport" response.

[0034] In one embodiment, the group communication server receives the responses from the target group members (e.g., user B, C, and D), and forwards a group response to user A, as shown in step **408**. Upon receiving the group response, user A may update the status of his or her buddy list to include information that user B is "ON," user C is "OFF," and user D is "in meeting" or "at airport."

[0035] In one embodiment, some or all of the target users (e.g., B, C, and D) may also update status information of their buddy list members. When such target users receive an alert from user A, in step **404**, indicating that user A is ON, such target users may update their buddy lists to include information that user A is ON, if user A appears in buddy lists of such target users. As recognized in FIG. 4(A), user may have different personalized buddy lists to preserve their privacy. For better privacy, a user may block any number of other users from contacting the blocking user. So that no information about the blocking user may be shared with other blocked users.

[0036] In one embodiment, when any one of target users sends a status response to the GCS to be forwarded to user A, in step **406**, the GCS may also send such responses to other ones of such target users to update their buddy list accordingly. For example when user B sends an "ACK" response, in step **406**, indicating that user B is ON, the GCS may send the ACK response received from user B to target users C and D to update the status of user B to ON in their buddy lists, if user B appears in their buddy lists. FIG. 4(B) shows the final state of the user presence and/or location information exchange after user A sends the group alerts in step **402**.

[0037] In one embodiment, a user may request the GCS to determine the status of a designated user or a group of users, determine the group members that are currently registered, and/or determine the group members who are participating in a group communication session. The user may choose an existing group name or create an ad-hoc group, and send the request for information about the group to the GCS, as shown in step **502**. The GCS may provide status information about the designated group, e.g., whether the designated group is active or inactive, as shown in step **504**, provide information about the members of the designated group who are registered, as shown in step **506**, provide information about the members of the designated group who are participating in a current communication session, as shown in step **508**, and/or provide information, e.g., location information, about the group members, as shown in step **510**.

[0038] For example, when user A requests information about a group of users that includes seven members (e.g., A, B, C, D, E, F, and G), the server's response, in step **508**, may include information that the designated group is active with five participants (e.g., A, B, C, F, and G), and the nonparticipating members of the designated group are either registered (e.g., user D) or not (e.g., user E).

[0039] In one embodiment, the presence and/or location information may be shared among the members of a designated group without establishing a communication session, e.g., without talking; thus, providing better privacy for the group members.

[0040] In one embodiment, the presence and/or location information may be shared among the members of a designated group without burdening the group communication server with group configuration; thus, providing the service providers easy ways of billing each user based on their activity.

[0041] Those of skill in the art would understand that information and signals may be represented using any of a variety of different technologies and protocols. For example, data, instructions, commands, information, signals, bits, symbols, and chips that may be referenced throughout the above description may be represented by voltages, currents, electromagnetic waves, magnetic fields or particles, optical fields or particles, or any combination thereof.

[0042] Those of skill would further appreciate that the various illustrative logical blocks, modules, circuits, and algorithm steps described in connection with the embodiments disclosed herein may be implemented as electronic hardware, computer software, or combinations of both. To clearly illustrate this interchangeability of hardware and software, various illustrative components, blocks, modules, circuits, and steps have been described above generally in terms of their functionality. Whether such functionality is implemented as hardware or software depends upon the particular application and design constraints imposed on the overall system. Skilled artisans may implement the described functionality in varying ways for each particular application, but such implementation decisions should not be interpreted as causing a departure from the scope of the present invention.

[0043] The various illustrative logical blocks, modules, and circuits described in connection with the embodiments disclosed herein may be implemented or performed with a general purpose processor, a digital signal processor (DSP), an application specific integrated circuit (ASIC), a field programmable gate array (FPGA) or other programmable logic device, discrete gate or transistor logic, discrete hardware components, or any combination thereof designed to perform the functions described herein. A general-purpose processor may be a microprocessor, but, in the alternative, the processor may be any conventional processor, controller, microcontroller, or state machine. A processor may also be implemented as a combination of computing devices, e.g., a combination of a DSP and a microprocessor, a plurality of

microprocessors, one or more microprocessors in conjunction with a DSP core, or any other such configuration.

[0044] The steps of a method or algorithm described in connection with the embodiments disclosed herein may be embodied directly in hardware, in a software module executed by a processor, or in a combination of the two. A software module may reside in RAM memory, flash memory, ROM memory, EPROM memory, EEPROM memory, registers, a hard disk, a removable disk, a CD-ROM, or any other form of storage medium known in the art. An exemplary storage medium is coupled to the processor, such that the processor can read information from, and write information to, the storage medium. In the alternative, the storage medium may be integral to the processor. The processor and the storage medium may reside in an ASIC. The ASIC may reside in a user terminal. In the alternative, the processor and the storage medium may reside as discrete components in a user terminal.

[0045] The description of the disclosed embodiments is provided to enable any person skilled in the art to make or use the present invention. Various modifications to these embodiments may be readily apparent to those skilled in the art, and the generic principles defined herein may be applied to other embodiments, e.g., in an instant messaging service or any general wireless data communication applications, without departing from the spirit or scope of the invention. Thus, the present invention is not intended to be limited to the embodiments shown herein but is to be accorded the widest scope consistent with the principles and novel features disclosed herein. The word "exemplary" is used exclusively herein to mean "serving as an example, instance, or illustration." Any embodiment described herein as "exemplary" is not necessarily to be construed as preferred or advantageous over other embodiments.